AIRBORNE WEATHER RADAR

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TASK: Perform airborne weather radar interpretation.

CONDITION: In a classroom with highly intelligent aviators of the 3d MI BN, in a utility airplane under VMC, IMC or simulated IMC (5 to 6 beers) in a airplane or classroom.

AIRBORNE WEATHER RADAR

STANDARDS:

1. Correctly turn on, adjust, and operate the airborne weather radar according to the equipment instruction booklet and the aircraft operator's manual.
2. Obsreve all safety precautions during ground operations according to the given references.
3. Correctly analyze the displayed

AIRBORNE WEATHER RADAR

STANDARDS (Cont):

4. Avoid hazardous echoes by the following minimun lateral distances: (5, 10, 20 rule)

   a. Temperatures above 0 ° C -- 5 NM.

   b. Temperatures below 0 ° C --10 NM.

   c. Altitudes above FL 230 -- 20 NM.

5. Correctly perform crew coordination actions.

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WARNING

DO NOT operate the weather radar set while PERSONNEL or COMBUSTIBLE MATERIALS are within **18 FEET** of the antenna reflector.

When the weather radar set is operating, high-power radio frequency energy is emitted from the antenna reflector which can have harmful effects on the human body and can ignite combustible materials.

AIRBORNE WEATHER RADAR

CAUTION

DO NOT operate the weather radar set in a confined space where the nearest metal wall is **50 FEET** or less from the antenna reflector.

Scanning such surfaces may damage the receiver crystals.

AIRBORNE WEATHER RADAR

What Radar “IS”

- Our weather **AVOIDANCE** device - **NOT** a weather penatration device
- Inflight real-time **WATER** information
- A **CRUDE** avionic product

AIRBORNE WEATHER RADAR

Simple Terms

“A WATER DETECTION DEVICE”

HOW DOES IT WORK ?

DISTANCE AND DETECTION

- Radar is essentially a sounding device which tranmits a short pulse of electromagnetic energy and “listens” for a return of the pulse.
- Travels at the speed of light, 186,000 Miles per second
- Round trip radar mile - 12.5 microseconds (millionths of a second)
- Ranging is extremely accurate

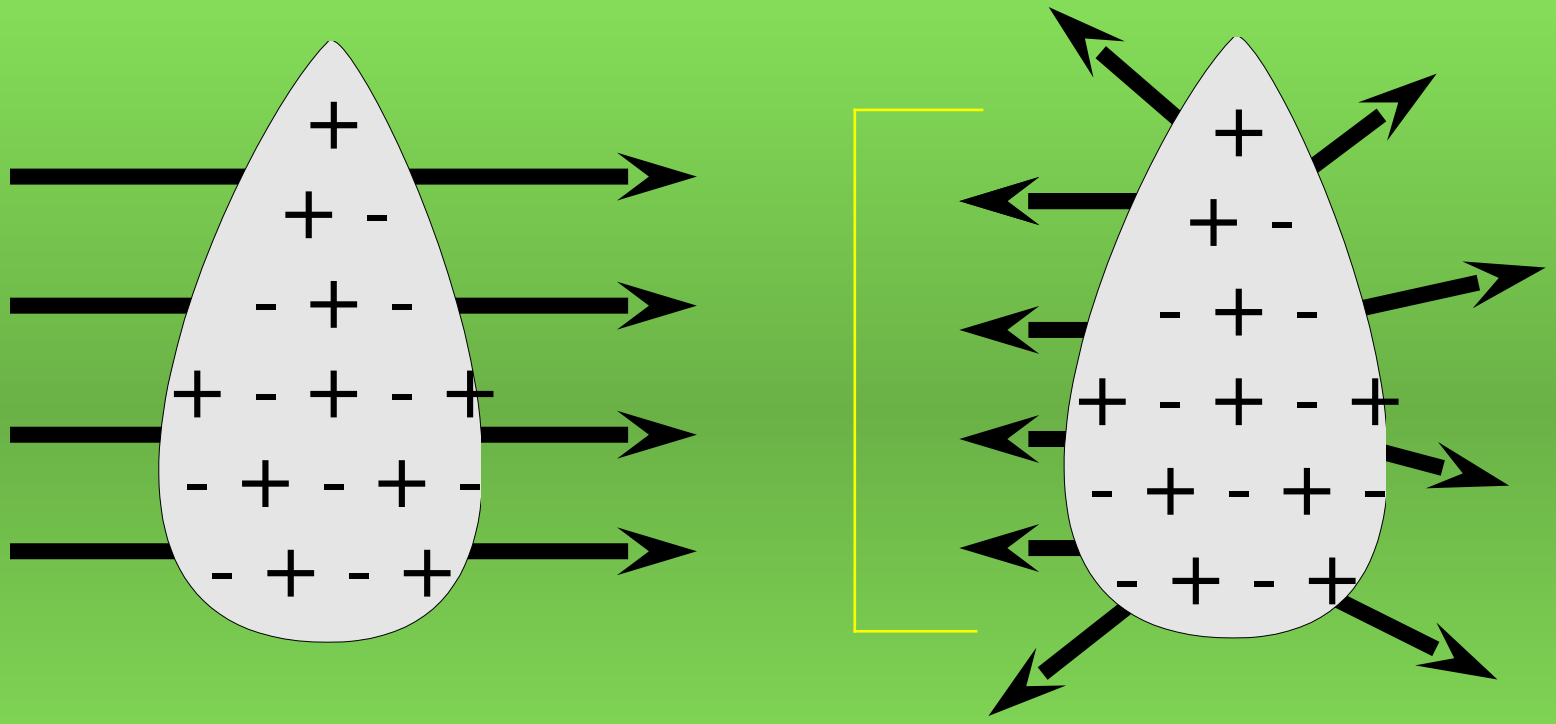
PULSE REPETITION & PULSE LENGTH

- Hundreds of pulses are transmitted every second, with a listening period between pulses.
- Pulse rates of 200 are common for longer range targets. Rates of 660 are common for short range targets.
- Short duration pulses are best as they provide better resolution.
- The longer the pulse, the more the tendency to “smear” the target in azimuth resolution.

WHAT ABOUT ANTENNAS ?

- Two types: Parabolic and Flat plate.
- Flat plate has more power in the main lobe.
- Flate plate minimizes side lobes which produces less irritating ground returns.
- Flate plate has better “Gain”, a measeure of antenna efficiency.
- Cost less

HOW IS THE ENERGY RETURNED ?



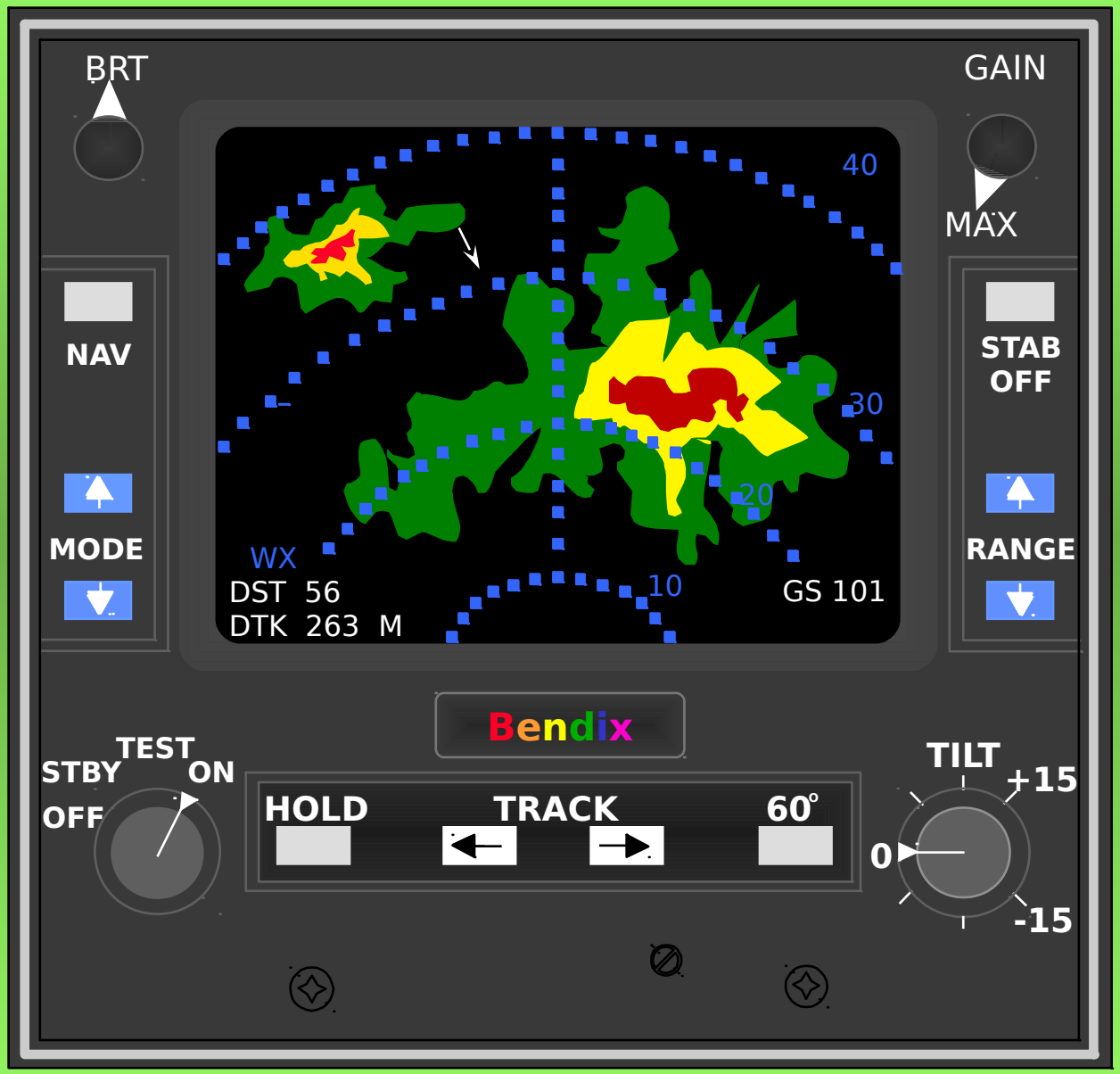
DIPOLING + SCATTERING

=

REFLECTIVITY

RADAR RETURNS - THE BOTTOM LINE

- Everything in nature seeks equilibrium
- Energy cannot be created or destroyed
- To get definition, you give up penetration.


BRT
GAIN
MAX
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WX
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DTK 263 M
GS 101
Bendix
TEST
STBY
ON
OFF
HOLD
TRACK
60°
TILT
+15
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-15

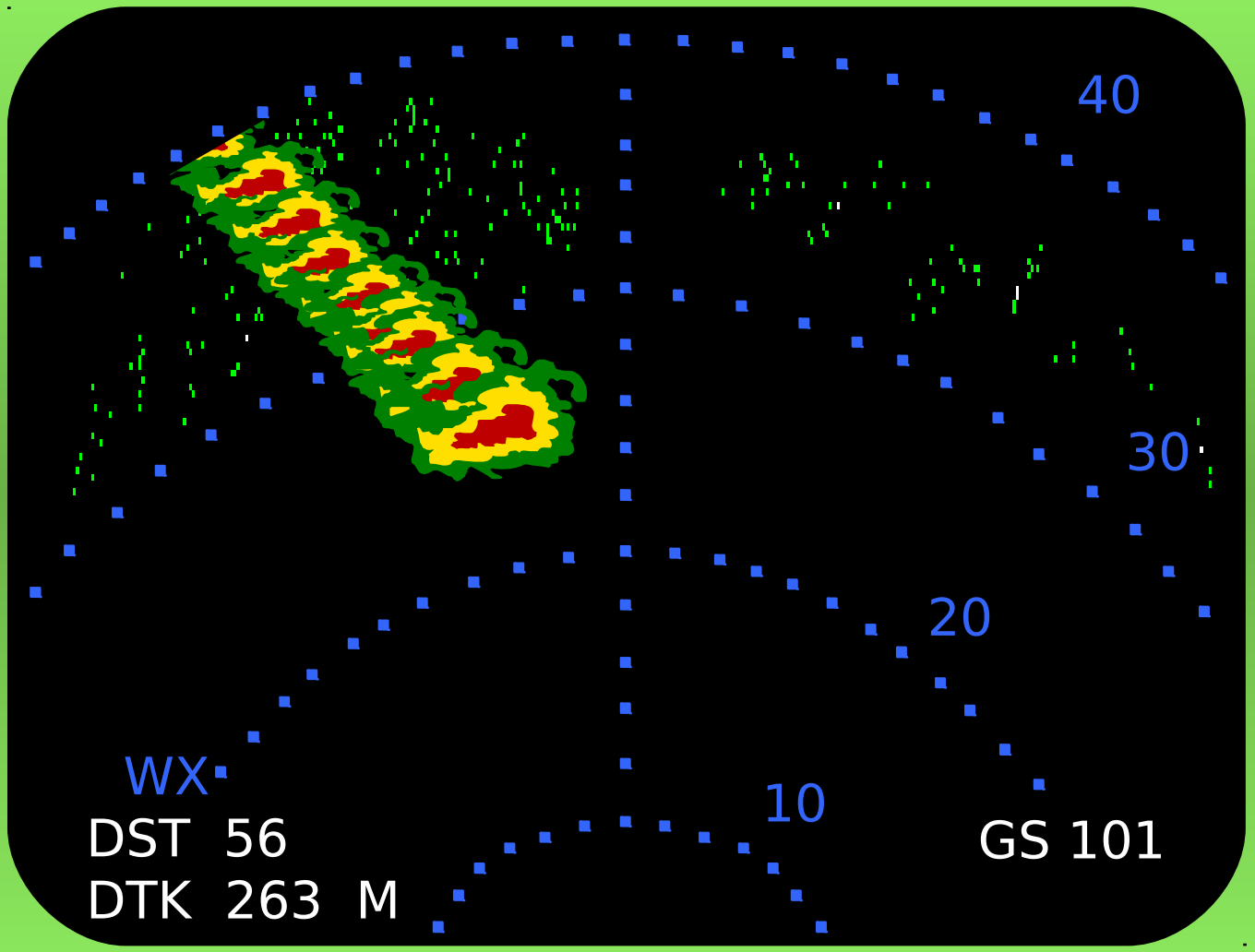
SCALLOP

VIDEO TAPE

“RADAR TRAINING”

MR. DAVE GWINN

“RADAR SHADOWING”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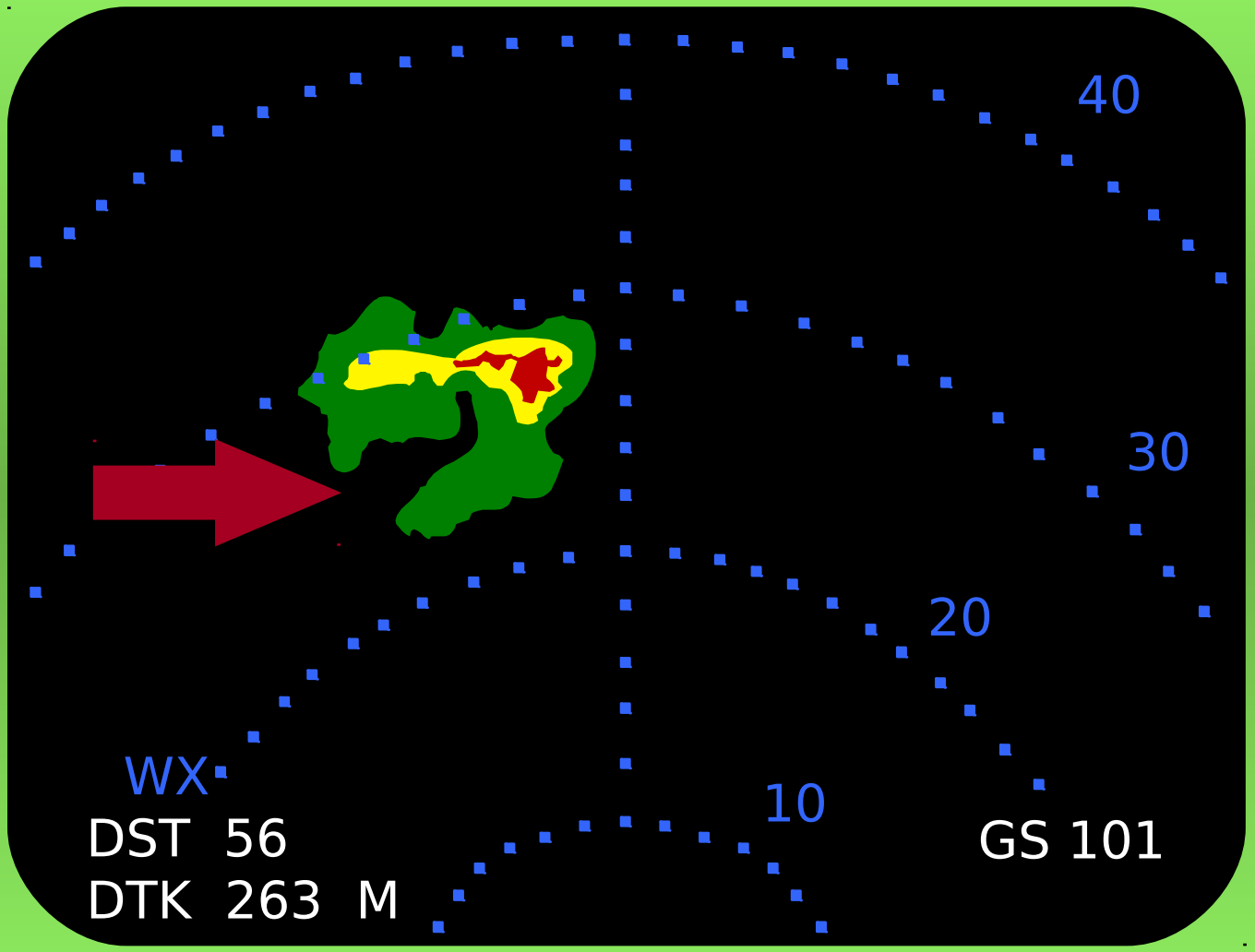
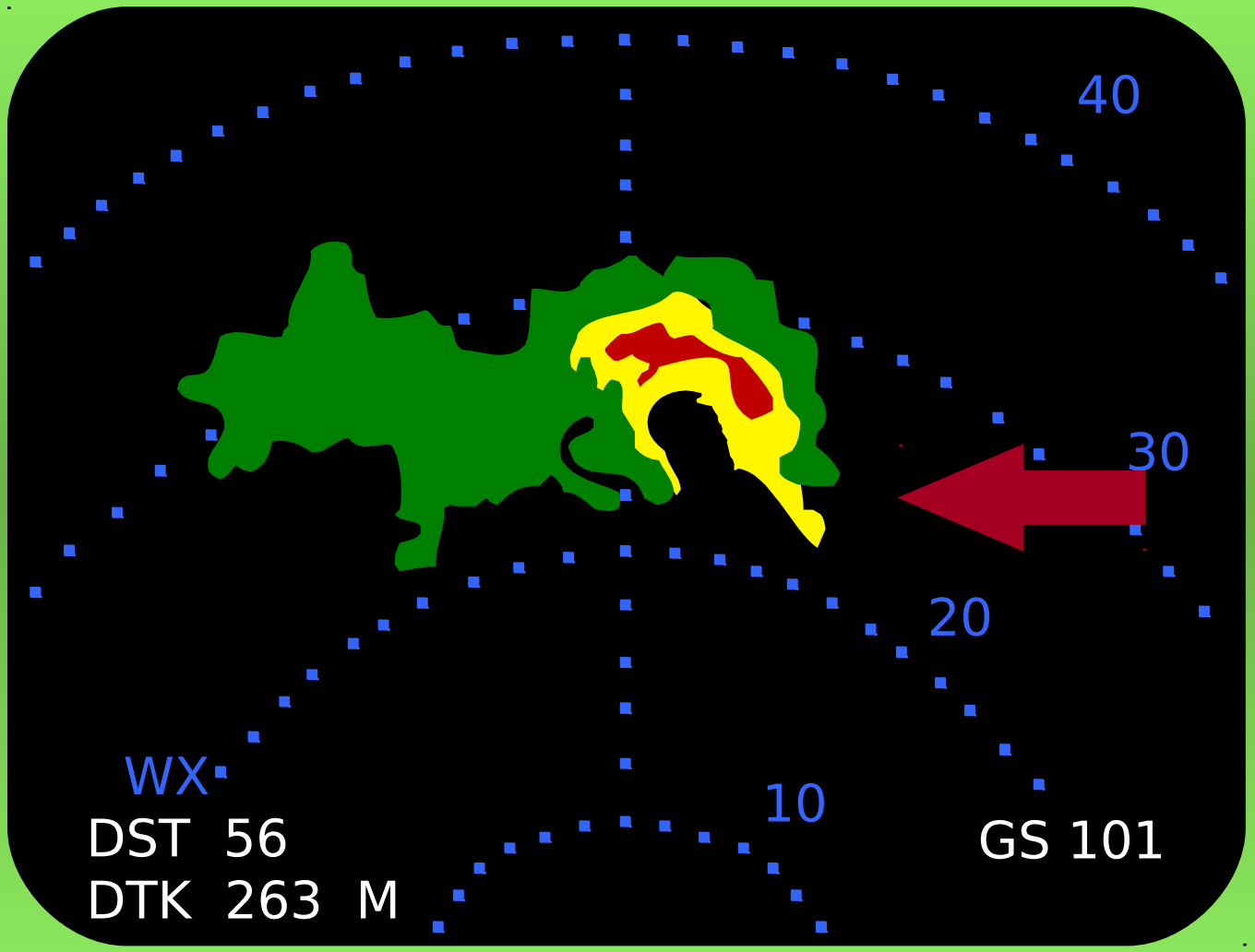
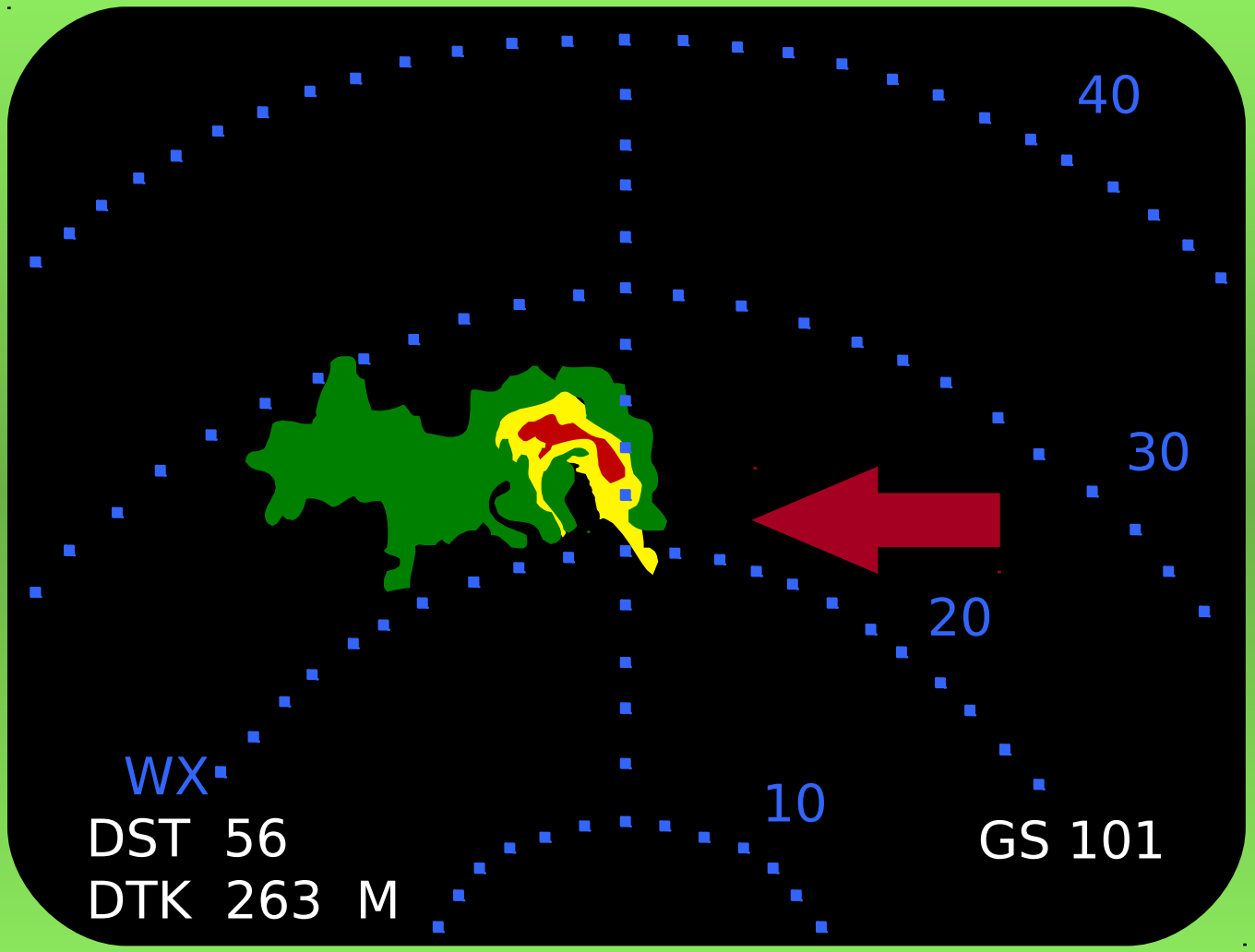


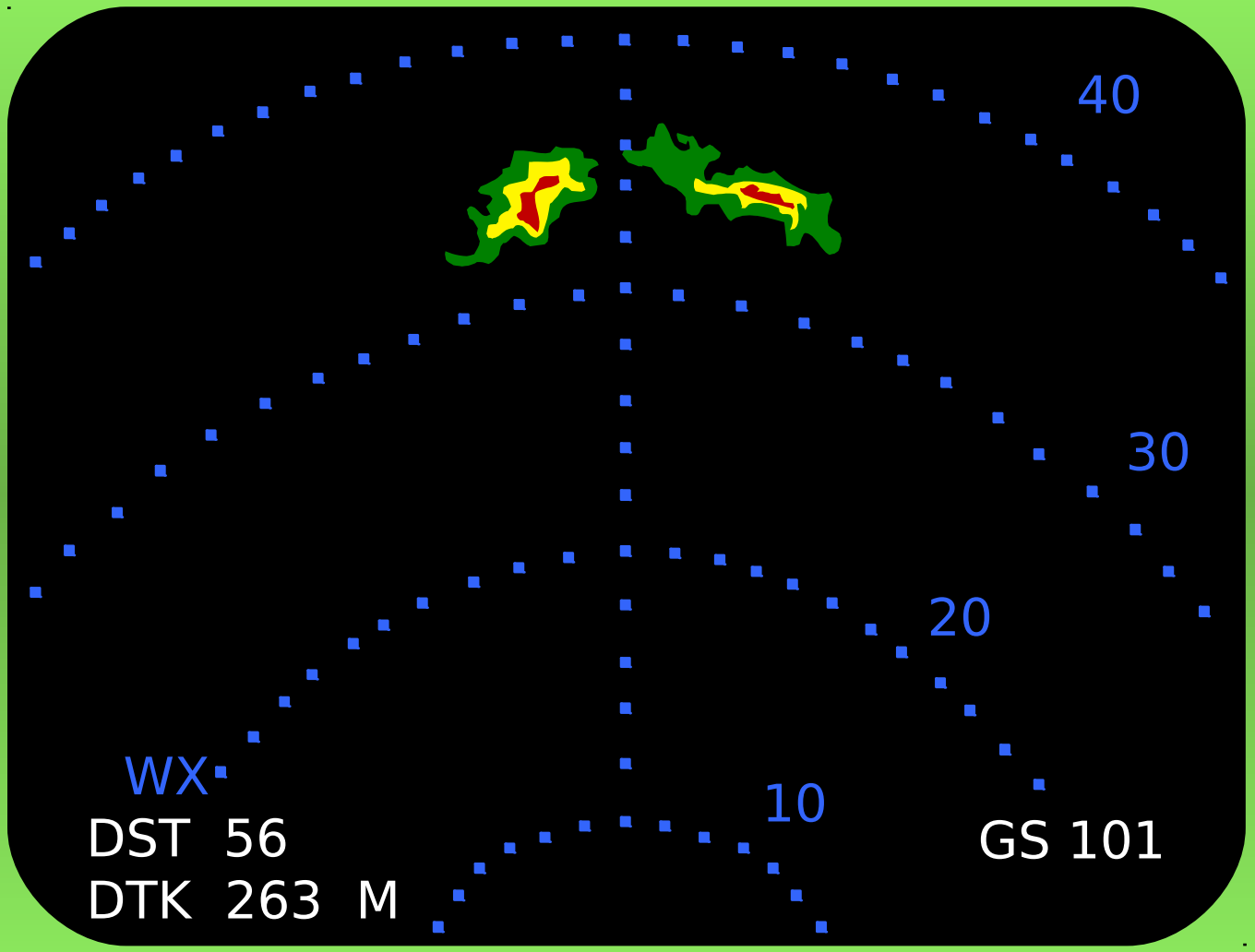
U-SHAPED



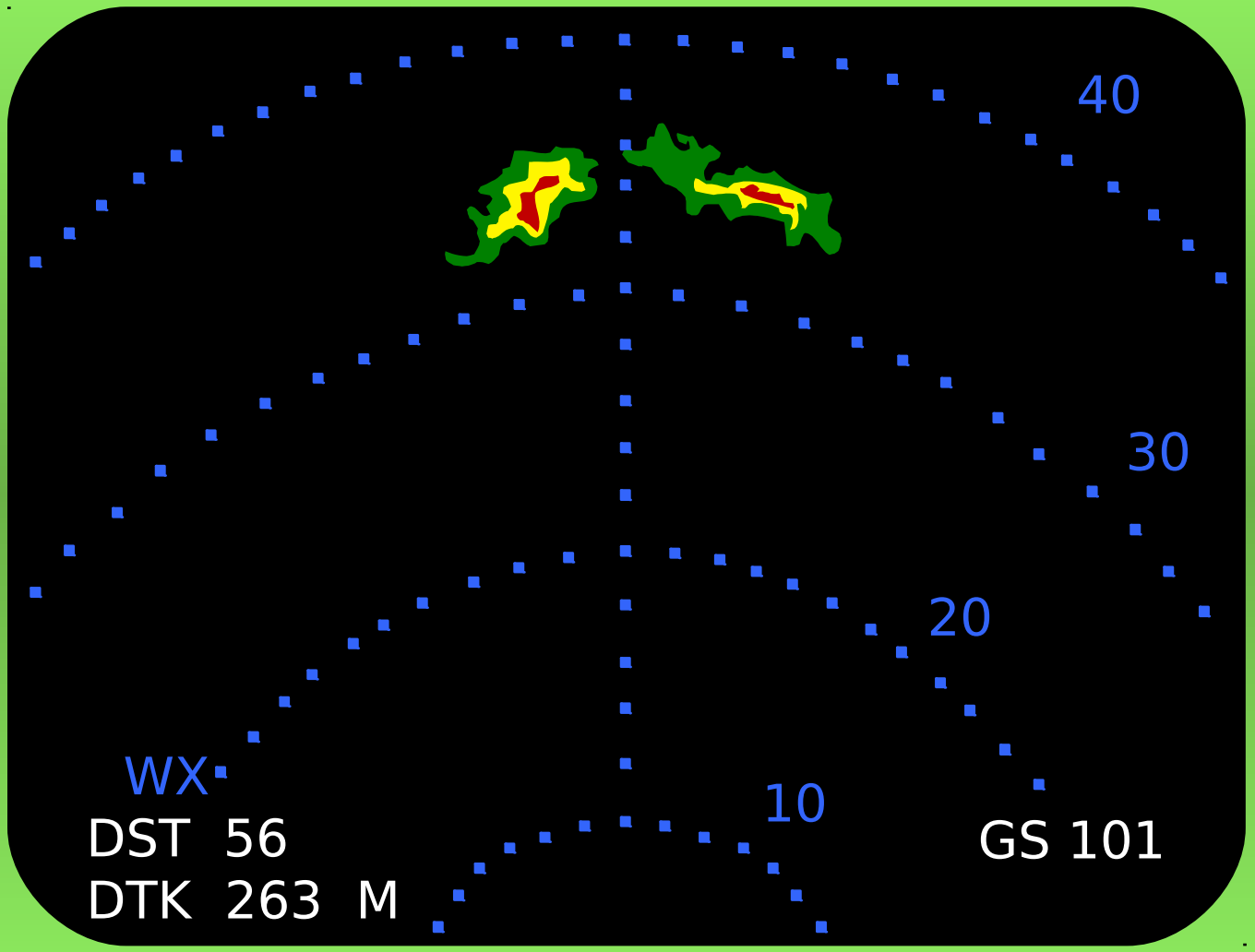
HOOK



FINGER



BLIND 1



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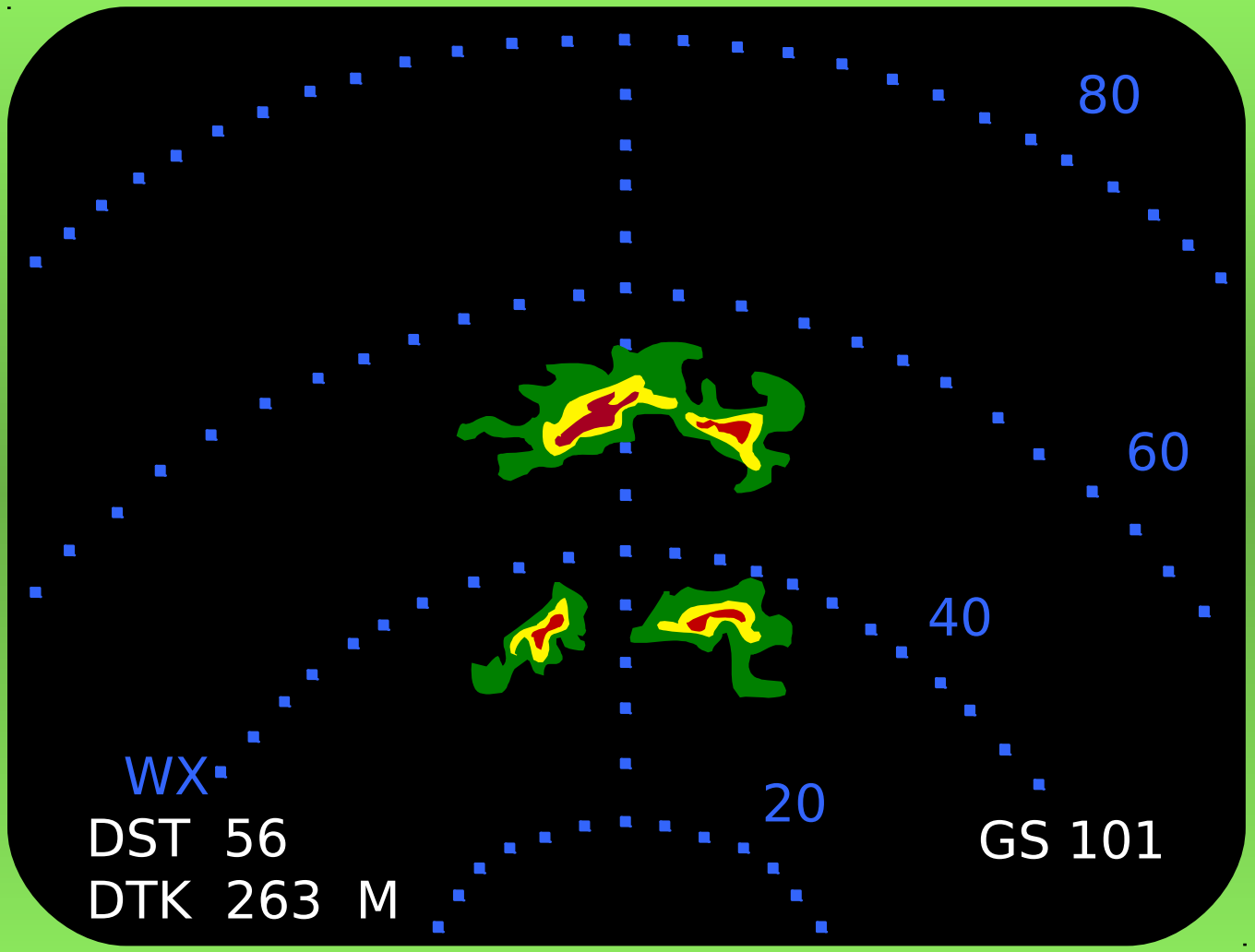
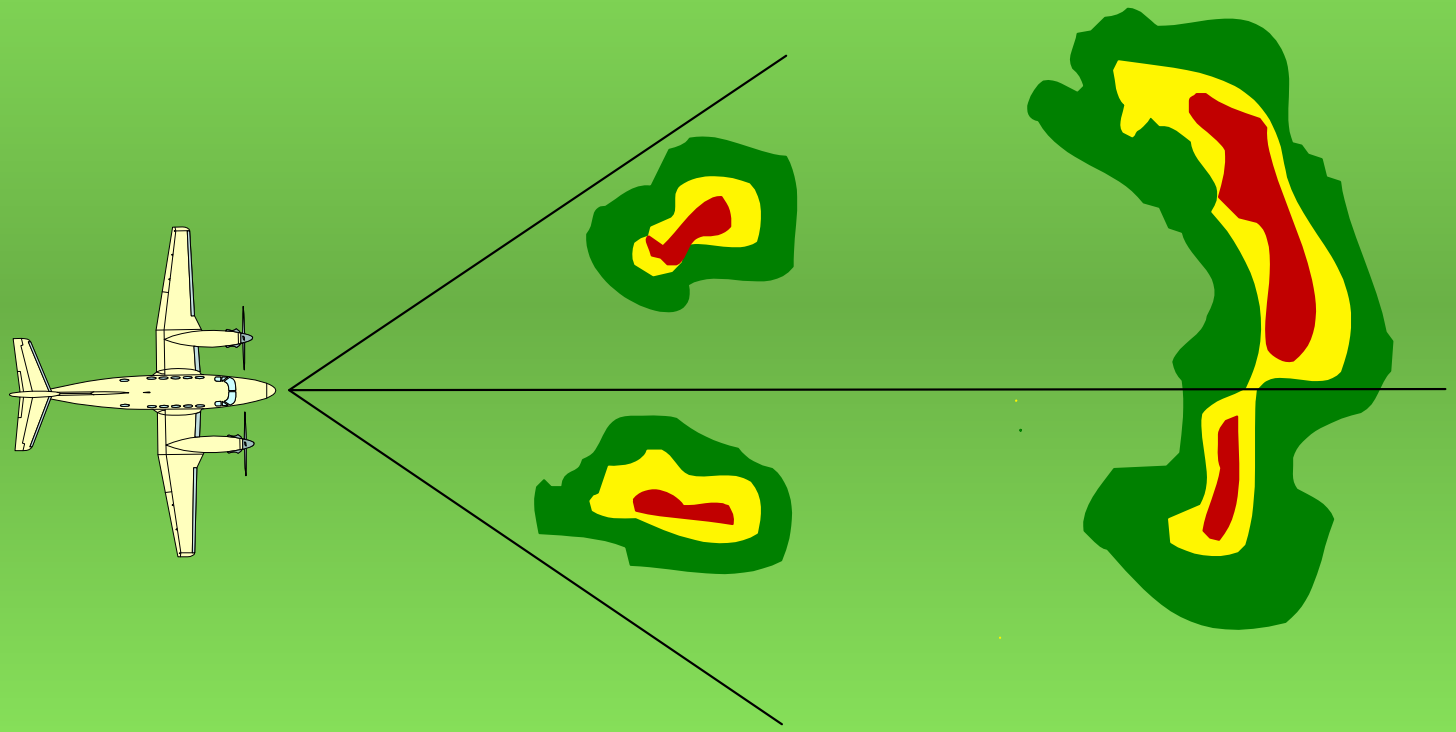


BLIND 2

THE BLIND ALLEY



ADDITIONAL ARES OF STUDY

- FUNDAMENTALS OF RADAR
- ANTENNAS
- METEROROLOGICAL TARGETS
- TILT CONTROL
- STABILIZATION
- TAKE OFF CONSIDERATIONS
- TERMINAL WEATHER

Thunderstorm Avoidance

TASK:

Discuss Thunderstorm Avoidance Procedures

CONDITIONS:

In a airplane under VMC, IMC, simulated IMC, or a classroom

STANDARDS:

Receive a through weather briefing

Comply with the operator’s manual, ATM, company SOP’s, and risk assessment

Correctly turn on, adjust and operate airborn weather avoidance equipment - if installed

Types of Thunderstorms

- Air Mass - Surface heating
- Steady State - Frontal Activity
- Tornado

Three Stage Life Cycle

- Cumulus (Developing)
- Mature
- Dissipating

Storm Facts

- An average of 44,000 thunderstorms occur daily over the surface of the earth
- <u>All</u> thunderstorms contain lightning and thunder
- Vary from 1 mile to 30 miles in diameter

Storm Facts

- Tops range from 20K to 65K
- Cloud tops are higher during summer
- Fewer storms in winter
- Mid-level - 14,000 ft. , the updrafts and downdrafts are adjacent to each other
- Classified in 6 levels (FAA)

FAA Levels

Storm Airborne Exp.	Level Display	Status NWS Type	Convective	Rate	Hazard Rate
I	Weak	.04 - .17	.02 in/hr	None	Green
II	Moderate	.17 - .5	.02 - 1.1	Mod	Yellow
III	Strong	.5 - 1.0	1.1 - 2.2	Strong	Red
IV	Very Strong Red		1.0 - 2.0	2.2 - 4.5	Severe
V	Intense	2.0 - 5.0	4.5 - 7.1	Extreme	Magenta
VI	Extreme	5.0+	7.1	Extreme++	Magenta

REMINDER

Airborne Weather Radar is based on

“STRATUS RAINFALL RATES”

Avoiding the Storm

- Receive a through weather briefing
- Comply with company SOP’s
- Operate the aircraft IAW the operator’s manual

Avoiding the Storm

- Utilize on board weather avoidance equipment if installed

- Use the 5,10,20 rule

- Listen to your conscious - “The Red Flag”

Blundering Through

- Slow to recommended penetration speed
- Secure loose articles, snug up seat belts and shoulder harness, secure flashlight
- Keep the wings level and use smooth, moderate elevator control to maintain pitch -" Ride the Waves"

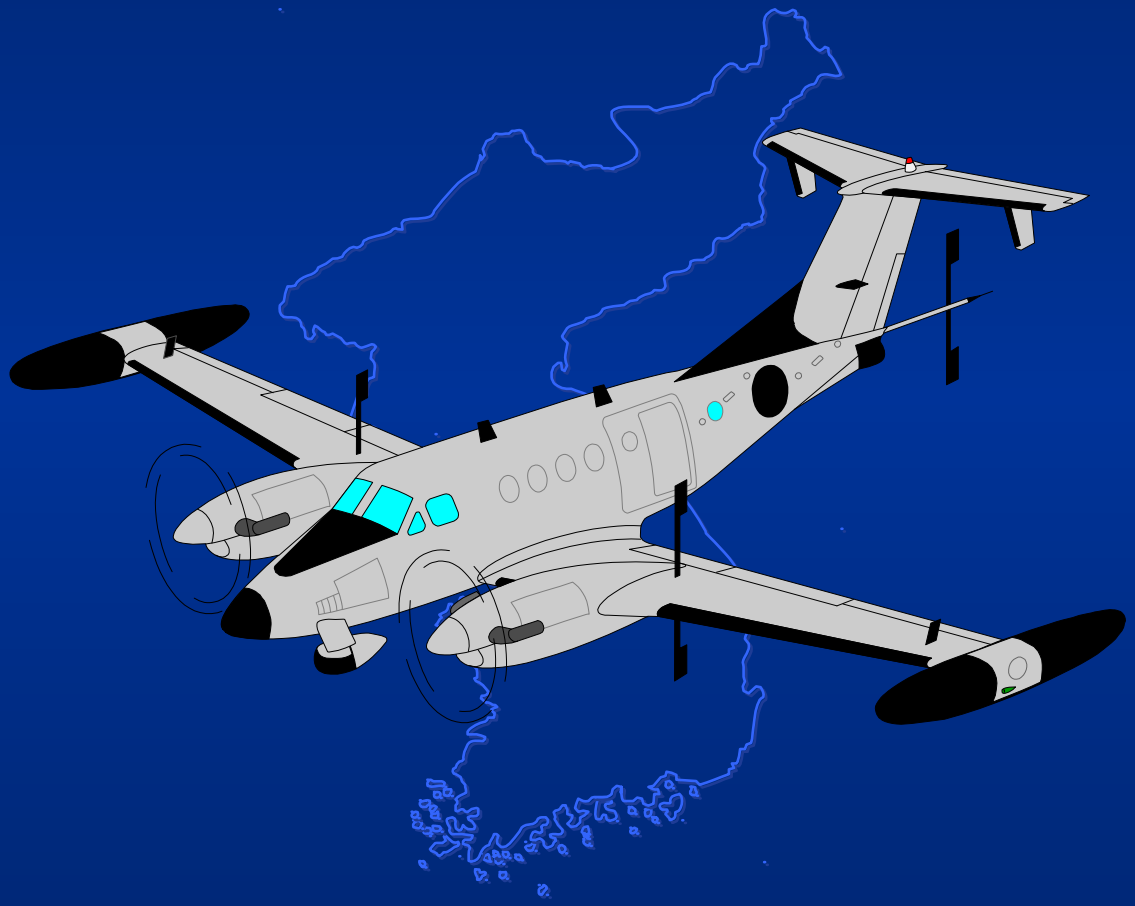
Blundering Through

- Don’t chase altitude
- If using the autopilot, conform with the operator’s manual
- Generally monitor attitude, airspeed and altitude - in that order
- Verify that anti-icing and de-icing equipment is on and operating

Blundering Through

- Turn up cockpit lights
- If possible, stay relaxed, maintain positive control and allow the aircraft to “wallow” through the storm
- Don’t turn back once you are in the storm

3d MI Bn (AE)



“WINGED VIGILANCE”